OCTOBER 2023

THE INNOVATION CATALYST

NEWSLETTER

INSIDE THIS ISSUE

See page 8 for details.

BYTE SIZED TALKS

Tuesday October 10, 2023

Join us for "Byte Sized Talks" on October 10th from 12-1 pm in the Building 21 cafeteria!

This initiative is designed to connect staff, share knowledge, and dive into SPO's various programs. Engage directly with experts, learn about technology transfer, awards, and how you could earn royalties.

Additionally, we will have tokens of appreciation for those who visit the booth (while supplies last) Don't miss this opportunity to learn and connect!

This month's Tech Transfer Tip with Technology Manager *Manohar Deshpande*

Do you know the advantages of patenting technology? Patents grant the right to stop others from copying, selling, or using an invention without permission. It helps attract capital for further improvement of an invention and advancement of its technology readiness level. For those patents that are successfully licensed, NASA offers a royalty sharing program for the NASA inventor(s).

NP-2023-9-151-GSFC

SPO Technology Manager Josh Levine speaks with attendee at the 2023 SmallSat Conference in Logan, Utah. Photo Credit: NASA/GSFC

Goddard Has a Big Showing at a SmallSat Conference

Goddard's booth at the 37th Annual SmallSat Conference took center stage at the premier conference on small satellites. Taking place at the Utah State University (USU) at Logan, Utah, on August 5-10, the conference provided a perfect forum for the best minds in the small satellite community to review recent successes, explore new directions, and introduce emerging technologies in small spacecraft development.

According to USU's Space Dynamics Laboratory, the organizer of the conference, this year's SmallSat Conference was the largest and best attended in history. The annual gathering drew approximately 3,700 attendees from 44 countries. That number surpassed the pre-COVID record of 3,500 set in 2019. Other records set at the annual gathering were the total number of exhibitors who rented booths at 266 and number of organizations represented at 1,000.

Goddard's booth was organized and represented by the center's Strategic Partnership Office (SPO) and Small Satellite and Special Project Office (S3PO). It was appropriately located in the NASA Lounge in USU's Taggart Student Center. It was also one of the biggest and best attended booths at the event.

"Good size, good location, and good foot traffic; the NASA Lounge area was a well-traveled area," said Luis Santos Soto, chief engineer in S3PO and attendee who supported the booth. "One of the main things about the conference is networking. Because there are just so many organizations represented in there, it is the perfect place to go from one booth to the other and have good conversations. In our case, there were attendees interested in collaboration and partnering with Goddard. So, we tried to take advantage of that and formulate ways of working together."

"Goddard had the biggest, best and most interesting booth at SmallSat," added Josh Levine, technology manager at SPO and one of the attendees who supported the booth. "There were a lot of companies in attendance who were making components like software, buses, antennas, and solar arrays for small satellites, but nobody was putting it all together in a science package like our booth did. So, in essence, everyone else showed the building blocks but we showed the breadth of what you can actually do when you put all the building blocks together."

At the conference, Goddard brought years of expertise in small satellite technology development and mission planning and execution. Goddard representatives shared with attendees how NASA is focused on developing architectures to

continued on page 3

continued from page 2

support the Distributed Systems Mission (DSM) system concepts. A DSM is a mission that involves multiple assets to achieve one or more common goals. Some DSM development includes constellations, formation flying missions, or fractionated missions. A key component and advantage of DSM is the idea that this is an open architecture where anyone can join and contribute to the network.

"Besides DSM, if there was another common theme people talked about at the conference, it was small satellites going beyond LEO (Low Earth Orbit)," said Santos Soto. "One beyond LEO SmallSat mission we developed in-house at Goddard is GTOSat (Geostationary Transfer Orbit Satellite), which is waiting for a launch opportunity. We talked about that at the conference."

Santos Soto explained that GTOStat is a 6U CubeSat science mission, which would also serve as a pathfinder for new radiation-tolerant technologies. GTOSat will enable the deployment of a DSM constellation of small satellites beyond LEO to gather simultaneous, multi-point measurements of Earth's ever-changing magnetosphere. GTOSat's primary goal is to advance NASA's understanding of acceleration and loss of relativistic electrons in the Earth's outer radiation belts.

"This is something that NASA Goddard has been looking into for years now – understanding how we could build systems beyond LEO without bankrupting the mission," said Santos Soto. "Goddard has developed our own technologies to serve that purpose. At the conference, there was interest among attendees in licensing our beyond LEO technologies, such as MARES [Modular Architecture for a Resilient Extensible SmallSat – a highly integrated modular architecture that is designed to withstand harsher environments beyond LEO] and different types of components that we have developed compatible with MARES."

Levine said that many of the technologies developed for Goddard's SmallSats, including patented MARES technologies can be licensed by interested companies in the public or government sector. Levine explained to attendees how they can license the patented Goddard technologies for their own use.

"The reason why our Goddard booth was so inviting was because people found out about all the great work Goddard is doing," said Levine. "At our booth, people would see things that they could not see within the commercial landscape."

"We were busy; it was pretty non-stop, people coming up to the booth and asking all kinds of questions about what Goddard is doing within the SmallSat realm," added Scott Leonardi, technology specialist at SPO and one of the attendees who supported the booth. "The two most popular items people took away from our booth were *The Spark* magazine and the stickers...everybody loves the NASA stickers. Pretty much all the handouts we had got taken away. Bottom line is there was a lot of interest in Goddard."

In addition to the booth, Goddard engineers and scientists participated as speakers or collaborators for over 30 scheduled technical presentations, technical posters, side meetings, and NASA organized Short Talks and Hyperwall presentations. Topics presented ranged from the use of Artificial Intelligence, DSM, SmallSat reliability, NASA's Operational Simulation for Small Satellites (NOS3), radio frequency communications for DSM and lunar missions, and a Pandora SmallSat mission overview. John Hudeck, who was part of the S3PO team, had a NASA Short Talks session entitled, SmallSats at Goddard Space Flight Center: Learning and Leaning Forward. "All of these sessions were well attended and had a presence that was beneficial for Goddard," said Santos Soto. "People were especially interested in the NOS3 and cFS (core Flight Simulator) sessions."

What is Software Protection?

Last November, IBM filed a lawsuit against Micro Focus, alleging the UK-based software company copied and reverse-engineered its Customer Information Control System (CICS) mainframe operating service to develop a rival product, the Micro Focus Enterprise Server. IBM is now seeking compensation in the U.S. District Court in New York as well as an injunction against Micro Focus that would prohibit the company from distributing the product it claims is based upon IBM's computer software. IBM was only able to file this lawsuit and injunction because the technology corporation had filed and received a patent from the U.S. Patent and Trademark Office (USPTO) for its CICS software.

Patents are a testament to innovation, and at Goddard, it all starts with a New Technology Report (NTR). When NASA Goddard innovators file an NTR for their software, the center's Strategic Partnership Office (SPO) gets to work determining if it can be commercialized and made available to private industry for licensure. Software is routinely licensed to industry through the NASA Technology Transfer Program's annual Software Catalog. Private companies, non-profits, and institutions can browse the latest digital online catalog at https://software.nasa.gov/ and download free software that can help them develop new products or projects.

Heather Goo is a patent attorney at NASA Goddard Space Flight Center, Photo Credit: NASA

For software to be made available for licensure, it must first be patented and protected by copyright law. Copyright licensing of software is done very much like patent licensing of other types of inventions. In both instances, SPO is the center's resident expert in licensing. Patent attorneys in Goddard's Office of General Council (OGC) must meet USPTO's legal requirement (35 U.S.C. 101) that a patent can only be granted for "any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof subject to additional requirements."

Patent Attorney Heather Goo explains that software patents can cover a stand-alone computer software program, a mobile device app, or software that is integrated into a mechanical device. "In order for software to be patentable, it must meet the same requirements as any other type of invention," she says. "It must be new, useful, and non-obvious."

continued on page 5

continued from page 4

Goo further defined software protection as protection of information that is stored on hardware and used by a computer system to perform operations. The protection of software is considered to include the protection of algorithms, program codes and graphical interfaces.

Matt Johnston, patent counsel at NASA Goddard Space Flight Center, Photo Credit: NASA

In the case of an inventor who has an innovation that contains both a hardware and software component and does not know which they should file for, Goo said this situation usually works itself out in the NTR filing process. "Often, most new technology includes both hardware and software components and are included in a single patent application up front," she said. "After the SPO office identifies commercial and licensing likelihood of the innovation, we will review the NTR. Whether it is deemed software or hardware, often, the process and goal is the same: identifying [patent] eligible novel utility. However, to the extent two separate novel [hardware and software] technologies exist, it can be divided into multiple applications."

Matt Johnston, the patent counsel at OGC highlighted important distinctions between hardware and software. "Hardware is simply an apparatus or device that has been designed to accomplish a specific function. It might be protected by a patent if that function is new, useful and nonobvious in light of other existing hardware. Software on the other hand, is an expression of an idea that has been saved as code created by authors, much like a photograph, book, or musical composition. Hardware rarely represents an 'expression' of an idea within the convention of authorship."

Besides filing for a patent under copyright law, the only other area under the law that can potentially protect software is what is legally known as a "trade secret." Goo said, "A trade secret is like the recipe for the original Coke. We don't know what it is, they don't give it out and it is locked in some vault. A very limited group of people have access to it and know what it is. NASA does not protect our software with a trade secret."

To become a member of the Patent Bar and practice law, the patent attorneys at OGC not only had to pass the bar exam through USPTO, but also first received a degree in some field of engineering or science. This ensures that counsel has at least a fundamental understanding of the terminology and the technology for which the inventors seek to protect.

Goo received her bachelor's degree from MIT in electrical engineering and computer science, and previously worked in the software development industry. "This gives me an understanding of what our software engineers are going through," said Goo. "I understand how they are developing the software, testing it, benchmarking it through different steps in the process and getting it to its final state. So, I understand what they are talking about and doing."

Both Johnston and Goo emphasize the need to file an NTR for any new software. One of the questions in the Progress/ Navigation page on the e-NTR webpage at https://invention.nasa.gov/ specifically deals with software. "Put as much detail into that NTR filing as possible because that is actually a record and a snapshot in time of what an inventor has done," stressed Goo. "The more information that we have, the better that we can evaluate what we are looking at [and ultimately ensure that your ideas are protected]."

Dr. Edward J. Wollack, a research astrophysicist in Goddard's Observational Cosmology Laboratory, Photo Credit: NASA

Goddard Innovator Earns a Place in NASA's Inventor's Hall of Fame

On August 31, Dr. Edward J. Wollack, a research astrophysicist in Goddard's Observational Cosmology Laboratory was named as one of the three 2022-2023 inductees into the NASA Technology Transfer Program's Inventors Hall of Fame (HOF). With 26 patent awards from the U.S. Patent and Trademark Office, Wallack has contributed to the design, fabrication, and characterization of sensors, waveguide structures, optics, and other components for ground, sub-orbital, and space-based applications.

"I must humbly say that this body of work represents contributions from numerous collaborators and student co-inventors," Wollack said. "I am grateful to have had the opportunity to consider future possibilities and alternative solutions to instrumentation challenges. It is wonderful to see these efforts have had impact beyond their intended domain."

The Inventors HOF is an annual NASA award given to "civil servant innovators who are making significant contributions to our nation by inventing new technologies." The HOF's criteria require candidates to hold a U.S. patent that has contributed significantly to the nation's welfare and the advancement of science. Presently there are 420 innovators in NASA's Inventors HOF.

The Inventors HOF helps underscore the work of Goddard's Strategic Partnership Office (SPO), which aims to facilitate and promote the transfer of NASA technology to the private sector. By filing his New Technology Report (NTR) and working with SPO, Wollack helped to ensure that the technologies developed by and for NASA are broadly available to

continued on page 7

continued from page 6

the public, maximizing the benefit to American taxpayers.

"Because of Dr. Wollack's willingness to participate in tech transfer, space technology has a chance to shine and spur economic development," said SPO Chief Darryl Mitchell. "He has helped Goddard foster and strengthen relationships with our external collaborators across a multitude of industries."

Wollack has been recognized for his impressive achievements in various fields. His research spans a broad range of topics that include cosmology, astronomical instrumentation, electromagnetic devices, and materials. These efforts have led to more than 524 publications (290 peer-reviewed and 234 contributed) in pure and applied science.

Wollack's professional recognitions include the Goddard Exceptional Achievement Award for Mentoring, the NASA Exceptional Service Award, the NASA Exceptional Achievement Medal, and the National Science Foundation Antarctic Service Medal. Wollack was also a member of the Wilkinson Microwave Anisotropy Probe science team, which was awarded the Gruber Cosmology Prize for the "precision determination of the age, content, and geometry of the universe" and the Breakthrough Prize for Fundamental Physics.

Wollack is a Goddard Senior Fellow and a member of the American Astronomical Society, the American Physical Society, the American Association for the Advancement of Science, and the International Astronomical Union. He is also a senior member of the Institute of Electrical and Electronics Engineers. Wollack received his B.S. degree in physics from the University of Minnesota in 1987 and his Ph.D. from Princeton University in 1994. He joined Goddard in 1998.

Wallock was joined in the 2022-23 HOF class with Lyndon Bridgewater, an aerospace engineer at the Johnson Space Center and Dr. Russell "Buzz" Wincheski, an instrumentation scientist at the Langley Research Center. Bridgewater, who holds 21 patents, is the robotic mobility technical discipline lead for the robotics division at Johnson and the lead systems engineer for VIPER (Volatiles Investigating Polar Exploration Rover). With 20 patents, Wincheski has led the research, development, and successful deployment of novel inspection technologies to ensure safety and mission success for the Space Shuttle, the International Space Station and Artemis.

Dr. Edward J. Wollack's Patents

US PATENT #7,746,190
POLARIZATION-PRESERVING WAVEGUIDE FILTER AND TRANSFORMER

US PATENT #7,412,175
INTERFEROMETRIC POLARIZATION CONTROL

US PATENT #7,616,903
INTERFEROMETRIC POLARIZATION CONTROL

US PATENT #7,609,978
INTERFEROMETRIC POLARIZATION CONTROL

US PATENT #7,830,224
A COMPACT MAGIC-T USING MICROSTRIP-SLOTLINE TRANSITIONS

US PATENT #8,198,956
COMPACT PLANAR MICROWAVE BLOCKING FILTERS

US PATENT #8,912,494
AN APPARATUS FOR ULTRASENSITIVE LONG-WAVE IMAGING CAMERAS

US PATENT #8,693,828
PHOTONIC CHOKE-JOINTS FOR DUAL-POLARIZATION WAVEGUIDES

US PATENT #9,373,891
A SMOOTH-WALLED FEEDHORN

US PATENT #9,012,008
IMPEDANCE MATCHED TO VACUUM, INVISIBLE-EDGE DIFFRACTION SUPPRESSED MIRROR

US PATENT #9,419,319
PHOTONIC WAVEGUIDE CHOKE JOINT WITH ABSORPTIVE LOADING

US PATENT #9,383,254
SYMMETRIC ABSORBER-COUPLED FAR-INFRARED MICROWAVE KINETIC INDUCTANCE DETECTOR

US PATENT #9,310,556
PHOTONIC WAVEGUIDE CHOKE JOINT WITH NON-ABSORPTIVE LOADING

US PATENT #1,066,3350
A TWO-DIMENSIONAL PHONONIC METAMATERIAL FILTER STRUCTURE FOR ULTRA-LOW-BACKGROUND DETECTORS

US PATENT #1,014,7992
PLANAR VIA-LESS CROSSOVER HAVING COPLANAR WAVEGUIDE CONFIGURATIONS AND STUB LAYERS

US PATENT #1,004,4320
A ROBUST WAVEGUIDE MILLIMETER WAVE NOISE SOURCE

US PATENT #1,046,6108
MOLYBDENUM NITRIDE ABSORBER COATING FOR A DETECTOR

US PATENT #1,048,3610
WAVEGUIDE MOUNT FOR MICROSTRIP CIRCUIT AND MATERIAL CHARACTERIZATION

US PATENT #1,045,8853
NIOBIUM TITANIUM NITRIDE THIN FILM COATINGS FOR FAR-INFARED ABSORPTION AND FILTERING

US PATENT #1,134,0392
LINEAR POLARIZATION SENSITIVE META-MATERIAL REFLECTOR AND PHASE MODIFICATION STRUCTURE AND METHOD

US PATENT #1,116,8188
PROCESS FOR FABRICATING ONE OR MORE ULTRA-LARGE AREA NANOSCALE POLYMER FILMS

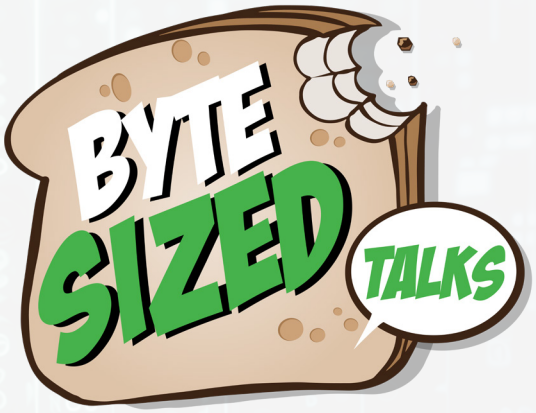
US PATENT #1,100,7685
FABRICATING ULTRA-THIN STRUCTURED POLYMER FILMS

US PATENT #1,131,3729
PHONONIC-ISOLATED KINETIC INDUCTANCE DETECTOR AND FABRICATION METHOD THEREOF

US PATENT #1,142,4401
PHONONIC DEVICES AND METHODS OF MANUFACTURING THEREOF

US PATENT #1,098,9604
CRYOGENIC DETECTOR WITH INTEGRATED BACKSHORT AND METHOD OF MANUFACTURING THEREOF

US PATENT #9,166,297
A SMOOTH-WALLED FEEDHORN



Mark your calendars because the launch date for our exciting new initiative, "Byte Sized Talks," is set for **October 10th, 2023**, from **12:00 PM to 1:00 PM**. Join us in the building 21 cafeteria for a refreshing twist on the traditional lunch-and-learn format!

As more of our fantastic staff return to the vibrant halls of Goddard, we're thrilled to introduce this monthly in-reach program designed to foster connections and knowledge-sharing among members of the Strategic Partnership Office (SPO) and our wider Goddard family.

What's "Byte Sized Talks" All About?

Imagine this: a friendly atmosphere where SPO experts are easily accessible at an information hub right in the heart of our community - the building 21 cafeteria. This is your chance to engage with us directly, ask questions, and delve into the myriad programs and opportunities that SPO has to offer.

Discover, Learn, Engage

Ever been curious about technology transfer and the wizardry behind software releases? Eager to learn about the latest awards, recognitions, and how you could earn royalties? "Byte Sized Talks" has got you covered. This initiative, happening monthly during lunchtime, is here to enlighten you on these topics and more.

An Experience to Remember

For the kickoff of this event, as a token of our appreciation, attendees will get to walk away with a small surprise (while supplies last) that'll remind you of the enriching "Byte Sized Talks" encounter.

We can't wait to see you there!

STRATEGIC
PARTNERSHIPS OFFICE

ATTENTION EVERYONE!

Have you seen the SPO banners around campus?

Head over to Buildings 8, 23, 33, and 34
to scan the QR code and see where it takes you!